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SOUTHERN FOREST EXPERIMENT STATION

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New Orleans, La.

REPORT OF THE FOREST SURVEY ON THE LAND CLASSES IN THE NORRIS DAM WATERSHED IN TENNESSE AND VIRGINIA

By

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* - This is an advance release of Forest Survey data that will later be published in complete reports. This information is subject to such correction or amplification as may be found necessary as computations proceed.

[1] - The first three releases of this series have been issued as Occasional Papers 31, 34 and 36 of the Southern Forest Experiment Station.

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REPORT OF THE FOREST SURVEY

ON

THE LAND CLASSES IN THE NORRIS DAM WATERSHED

IN

TENNESSEE AND VIRGINIA

By

Southern Forest Survey Staff

This report classifies the land area of the Norris Dam Watershed Survey Unit in eastern Tennessee and southwestern Virginia. Land classes recongized by the Survey are based on kind of use, degree of slope, character of erosion damage, forest type, and forest site quality. The Norris Dam Watershed Survey Unit covers the Clinch-Powell River basin above the Norris Dam and includes all land which will drain into the Norris Dam Reservoir.[1]

This information is given in advance of the publication of a statistical report which will contain full information on forest stands of the unit. The data given in this advance release are preliminary and subject to correction and modification when final computations are complete and when more accurate figures are available for the area of the Norris Dam Reservoir. It is believed however, that any corrections or changes neccessitated will change the area figures here given by only a very small percentage.

The data on which this report is based were gathered during the period between Februry 1934 and August 1934 by the Forest Survey, an activity of the Southern Forest Experiment Station of the Branch of Research, U. S. Forest Service. These data were obtained by a line plot survey in which parallel compass lines at intervals of 5 miles were run across the unit at right angles to the general direction of the drainage. Quarter-acre plots were taken every 660 feet along these lines.

The topography of the area varies from mountainous, with steep or often precipitous slopes and narrow valleys, to rolling hills with gentle to moderate slopes and wide valleys. Where the slopes and depth of soil permit, the land has been cleared and put into cultivation or pasture. In general, the forest occupies the steeper and more rocky slopes. Areas of forest land are well distributed over the unit and make up almost half of the entire land area.

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[1]The total area of the unit is taken from War Department Bulletin No.308. The figure given is 2,949 square miles. The preiminary estimate of the area to be occupied by the Norris Dam Reservoir, as given by the Tennessee Valley Authority, is 35,000 acres. Figures given in this report exclude the area of the reservoir.

Table 1. - Distribution of land area[1] by class of land use, in the Norris Dam Watershed Unit in Tennessee and Virginia

Land use classes	Area in acres	Percent of total area
Forest:	885,800	47.8
Nonforest:		
Agricultural:		
In cultivation:		
Old crop land[2]	416,500	22.5
New crop land[3]	24,100	1.3
Out of cultivation:		
Idle[4]	36,100	2.0
Abandoned[5]	20,800	1.1
Pasture[6]	419,000	22.6
Total Agricultural	916,500	49.5
Other areas:		
Roads, railroads, towns, waterways	50,100	2.7
Total forest and nonforest	1,852,400	100.0

[1] Area that, according to estimates, will be occupied by the Norris Dam pool is not included in this table.

[2] Land cultivated more than 3 years and on which a farm crop was raised within 2 years prior to date of survey. Orchards are included in this class.

[3] Land converted from forest to crop land within the past three years as indicated by stumps or deadened trees on the land.

[4] Cultivated land that has not been used for two years or more, but which has not reached the abandoned class.

[5] Land once cultivated but showing distinct evidence of having been abandoned for agricultural purposes; no attempt is being made to keep it as pasture. Forest growth is not yet established.

[6] Cleared land under fence used for grazing.

Table 2. - Area of agricultural land classified by land use and topographical classes

Land use class	Topographical class					Percent of total agricultural land
	Slope 0-15%	Slope 16-30%	Slope 31-60%	Slope over 60%	Total all classes	
	----------Area in acres ----------					
Agricultural land:						
In cultivation:						
Old crop land	162,200	168,000	76,300	10,000	416,500	45.5
New crop land	3,300	6,700	13,300	800	24,100	2.6
Out of cultivation:						
Idle	5,800	13,700	14,500	2,100	36,100	3.9
Abandoned	2,100	8,700	8,700	1,300	20,800	2.3
Pasture	91,200	153,900	152,300	21,600	419,000	45.7
Total	264,600	351,000	265,100	35,800	916,500	100.0
Percent of total agricultural land	28.8	38.3	29.0	3.9	100.0	

Character and Prevalence of Soil Erosion

The erosion encountered on survey plots was classified according to the classes described below. When more than one class of erosion was present the most advanced stage was recorded.

Sheet erosion - Where the soil is washing off from a generally smooth surface and where the cutting into the soil is very shallow (less than one foot).

Shoestring erosion - Where erosion has progressed to such a point that the surface is cut into, and a system of small, shallow, branching gullies not over 2 feet deep is formed.

Gullies - Where erosion is well-advanced and the surface is deeply cut into V-shaped gullies from 2 to 10 feet deep.

Extensive gullies - Where the soil has washed to such an extent that the cuts are more than 10 feet deep.

Erosion arrested - Where erosion has been stopped by natural growth of grass, vines, shrubs, or trees, or by artificial means such as dams, terracing, etc.

The acreage of agricultural land falling in each class as described from the plot records is shown in table 3.

Table 3 .- Area of agricultural land classified by degree of erosion and agricultural land class

Degree of erosion	Class of agricultural land				Percent of total agricultural land
	Crop land in cultivation	Idle and abandoned crop land	Pasture	Total	
	---------- Area in acres ----------				
Sheet erosion	83,500	7,100	64,700	155,300	16.9
Shoestring erosion	16,200	2,500	15,300	34,000	3.7
Gullies	5,000	5,800	13,700	24,500	2.7
Extensive gullies	1,200	400	1,700	3,300	.3
Total active erosion	105,900	15,800	95,400	217,100	23.6
Erosion arrested	1,600	800	6,600	9,000	1.0
No erosion present	333,100	40,300	317,000	690,400	75.4
Total	440,600	56,900	419,000	916,500	100.0

Description of Forest Area

For descriptive purposes the forest area has been classified into: (a) forest conditions on the basis of stand age and cutting history, (b) forest types on the basis of association of tree species. The descriptive terms used in these classification systems are defined as follows:

Definition of forest conditions:

Old-growth - Stands which have the superficial characteristics of the original mature forests of the region and forest type. There has been no cutting, except perhaps an occasional tree for some special product.

Old-growth partly-cut - Old-growth stands from which an appreciable quantity of high-grade timber has been removed. These stands still contain, however, a sufficient volume of material of saw-log size and quality to provide a cutting of 1,000 board feet per acre or more.

Second-growth saw-log size - Stands of pine or hardwoods which have developed following logging, clearing, or destruction by fire, and have at least 600 board feet per acre in trees of merchantable size. Less than 10% of the trees of saw-timber size have been cut. These stands often contain residual trees from the former old-growth stands.

Second-growth saw-log size partly-cut[2] - Second growth stands of pine or hardwoods from which over 10% of the trees of saw-log size have been cut and which still have a volume of at least 400 board feet per acre in trees of merchantable size.

Second-growth under-saw-log size[3] - Stands of young pine or hardwood one inch and over in diameter at 4½ feet above the ground, in which the volume of timber in trees of saw-timber size or larger is less than 600 board feet per acre and the remainder of the stand is below saw-timber size. Less than 10% of the trees under saw-log size have been cut.

Second-growth under-saw-log size, partly-cut - The same as second-growth under saw-log size except that more than 10 percent of the trees have been cut.

Reproduction - Stands of young trees not over 1 inch in diameter at 4½ feet above the ground which have become established on old fields, or on areas denuded of their former stand by clear cutting, fire or other agency.

Clear-cut and fire-killed - Forest areas on which practically all of the trees have been killed or removed by fire or cutting and no reproduction has taken place.

Noncommodity and rocky out-crops - These are forest areas that will not grow commercial timber because of rock out crops or soil conditions.

Definition of forest types.

Hardwoods - Pure or mixed stands of hardwood species and stands of mixed pine and hardwood where less than 25% of the merchantable volume or less than 25% of the dominant and codominant trees are pine, and stands of cedar and hardwoods in which hardwoods predominate in merchantable volume or number of dominant and codominant trees.

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[2] Stands of cedar having at least 200 linear feet per acre of post or saw-log material in the boles of trees 5.0 inches or over in diameter are classified as "second-growth under-saw-log size partly-cut" regardless of their cutting history.

[3] Stands of young cedar one inch and over in diameter are included with second-growth under-saw-log size regardless of the amount of cutting if they have less than 200 linear feet per acre of post or saw-log material in the boles of trees 5.0 inches or over in diameter.

Pine-hardwoods - Where pine and hardwoods occur in the same stand, the type is classified as pine-hardwoods if pine makes up 25 to 75 percent of the merchantable volume or 25 to 75 percent of the number of dominant and codominant trees.

Pine - Stands in which pine makes up more than 75 percent of the volume or more than 75 percent of the dominant and codominant trees.

Cedar - Stands in which cedar predominates, that is, makes up 50 percent or more of the merchantable volume or 50 percent or more of the dominant and codominant trees.

Table 4. - Forest area by forest conditions and forest types

Forest Conditions	Forest types					Percent of total forest area
	Hardwood	Pine - hardwood	Pine	Cedar	Total	
	Area in acres					
Old-growth	21,200	800	400	-	22,400	2.5
Old-growth partly-cut	156,900	5,400	6,200	-	168,500	19.0
Second-growth saw-log size	170,100	15,400	8,300	-	193,800	21.9
Second-growth saw-log size partly-cut	87,100	7,800	4,600	15,400	114,900	13.0
Second-growth under-saw-log size	249,300	15,400	14,500	14,900	294,100	33.2
Second-growth under-saw-log size partly-cut	23,200	400	1,300	-	24,900	2.8
Reproduction	49,800	2,500	3,300	9,100	64,700	7.3
Clear-cut and fire-killed	400	-	-	400	800	.1
Noncommodity	1,700	-	-	-	1,700	.2
Total	759,700	47,700	38,600	39,800	885,800	100.0
Percent of total forest area	85.7	5.4	4.4	4.5	100.0	

Site Quality for Hardwoods

Three broad site classes for areas in the hardwood and pine-hardwood types are recognized. These site classes are determined from curves of total height over age for the Southern Upland Hardwoods. A brief description of each site follows:

Site 1, Good site - This site quality is found chiefly in coves and stream bottoms and on moist benches and lower slopes. The soil is usually a deep, friable, dark brown loam. The timber stands are dense when not reduced by cutting or fire and when mature are composed principally of trees averaging 3 or more logs per tree.

Site 2, Fair site - This is an intermediate site where soil and moisture conditions are not as favorable to tree growth as on site one, but where good commercial timber can be produced on a longer rotation. Mature stands consist of trees averaging less than 3 logs each but more than 1½ logs each for the hardwood species.

Site 3, Poor site - The poorest sites usually occupy the dry, upper slopes and ridges. Here the soil is shallow and lacks fertility. Occasional rock outcrops and cliffs occur, and the soil is frequently very rocky. This site is more likely to be found on south and west slopes than on north and east exposures. The hardwoods on this site are usually short-bodied and when mature seldom average as much as 1½ logs each.

Table 5. - Forest area in the combined hardwood and pine-hardwood type classified by forest conditions and site quality

Forest conditions	Site quality		
	Site 1	Site 2	Site 3
	Area in acres		
Old-growth	7,900	12,400	1,700
Old-growth partly-cut	31,500	120,000	10,800
Second-growth saw-log size	45,200	130,800	9,500
Second-growth saw-log size partly-cut	10,000	78,300	6,600
Second-growth under-saw-log size	28,200	221,500	15,000
Second-growth under-saw-log size partly-cut	2,100	19,900	1,600
Reproduction	400	49,000	2,900
Clear-cut and fire-killed	-	400	-
Noncommodity	-	400	1,300
Totals	125,300	632,700	49,400
Percent of total hardwood and pine - hardwood area	15.5	78.4	6.1

Site Quality of Areas in the Pine Type

In the pine type, the quality of the site from the point of view of its capacity for tree growth is measured in terms of the average height attained by dominant or co-dominant trees at 50 years of age. Shortleaf pine was used as the site index.

Table 6. - Area of the pine type classified by shortleaf pine site index

Shortleaf pine site index in feet	Area in acres	Percent of total pine area
40	1,700	4.4
50	5,800	15.0
60	6,600	17.1
70	17,000	44.1
80	5,800	15.0
90	1,700	4.4
Total area pine type	38,600	100.0